

## Hwk 9-4

1. **Campus security.** Choice B.
2. **Call-in poll.** Choice B.
3. **Roundabouts.** Choice D.
4. **Homeroom.** Choice C.
5. **TTYL.** Choice D.
6. **Roper.**
  - a) Roper is not using a simple random sample. The samples are designed to get 500 males and 500 females. This would be very unlikely to happen in a simple random sample.
  - b) They are using stratified sample, with two strata, males and females.
7. **Student Center Survey.**
  - a) The students are not using a simple random sample. The samples are designed to get 50 students from each grade level. This would be very unlikely to happen in a simple random sample.
  - b) They are using a stratified sample, with four strata, one for each class year.
8. **Emoticons.**
  - a) This is a voluntary response sample.
  - b) We have absolutely no confidence in estimates made from voluntary response samples.

<b>Census</b>	A sample that consists of the entire population.
<b>Simple Random Sample (SRS)</b>	A sample in every possible group of a certain size has an equal probability of being part of the sample as any other group of that size.
<b>Stratified Random Sample</b>	A sampling design in which the population is divided into several subgroups that share some common characteristic, then a random sample is taken of each subgroup.
<b>Cluster Sample</b>	A sampling design in which entire groups are selected at random. Every member of that group then becomes part of the sample.

<b>Systematic Sample</b>	A sampling design in which individuals are drawn from the population according to some nonrandom algorithm.
<b>Convenience Sample</b>	A sample consisting of individuals who are readily available.
<b>Voluntary response bias</b>	Bias introduced when individuals decide on their own that they want to be part of a sample.
<b>Undercoverage</b>	Bias introduced when a portion of the population has less representation in the sample than it has in the population.
<b>Nonresponse bias</b>	Bias introduced when a large portion of the sample simply does not participate.
<b>Response bias</b>	Anything in a survey design that influences responses.

**Day 6** - Parameter vs. Statistic

Recall the difference between the population and sample. Describe in your own words.

Population = entire group selected

Sample = part of the group/population

Does a census always make sense? *No*

*Sometimes → more detailed data*

First what is a census?

- getting everyone's opinion*
- a sample consisting of the entire population*

A census can be problematic for 3 main reasons:

- 1. Takes longer - populations rarely stand still*
- 2. Difficult to do - hard to find sample, expensive, impractical*
- 3. Can be complex than sampling*

Because using the entire population presents some issues, it is preferable to sample or look at a portion of the population. List 2 types of sampling and 2 types of bias underneath.

### Sampling

1. *Stratified*
2. *Cluster*  
*SRS, Convenience,*  
*Voluntary response*  
*Multi-Stage*  
*Systematic*

### Bias

1. *Undercoverage*
2. *Non-Response*
3. *Response*
4. *Voluntary Response*

We can use the word parameter to represent a numerical characteristic of the population. (Hint: They both start with p)

Also, we can use the word statistic to represent a numerical characteristic of the sample. (Hint: They both start with s)

The statistic will be an estimate of the corresponding population parameter

Sampling frame refers to \_\_\_\_\_

the list of individuals from which  
the sample is drawn

Sampling variability is not an error (bias)

Samples drawn at random will have some  
variability. (No two samples are  
the same)

## HW 9-6 read page 222-224 and answer the questions below

1. A survey commissioned by Piper Jaffray in April 2014 contacted a random sample of 7,500 U.S. teens. 61% of the teens said that they owned an iPhone, up from 55% in the fall of 2013. Which is true?
- I. The population of interest is all U.S. teens.
  - II. 61% is a statistic and not the actual percentage of all U.S. teens that own an iPhone.
  - III. This sampling design should provide a reasonably accurate estimate of the actual percentage of all U.S. teens that own an iPhone.
- A) I only      B) II only      C) III only      D) I and II      E) I, II, and III
2. A school district administrator sent a survey to all teachers in the district. Only 30% of the teachers responded to the survey. Which of the following is true?
- I. The people that did not respond are likely to be similar to those that did so he should use them as the sample.
  - II. This survey design suffered from non-response bias.
  - III. Because he sent the survey to everyone, this is a census and the results can be applied to the whole population.
- A) I only      B) II only      C) I and II only      D) II and III only      E) I, II, and III



3. Which of the following statements are true?

- I. One reason to use a sample rather than a census is that the population might change before you can complete the census.
- II. The results of a census will always be more accurate than the results of a sample.
- III. The results of a sample will always be more accurate than the results of a census.

☒ A) I only      B) II only      C) III only      D) I and II

4. Which is true about sampling?

- I. An attempt to take a census will always result in less bias than sampling.
- II. Sampling error is usually reduced when the sample size is larger.
- III. Sampling error is the result of random variations and is always present.

A) I only    B) II only    C) III only    ☒ D) II and III    E) all three